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Technology Enhancement Productivity Degraded Dryland through Quality Improvement Compost and Biochar with Indicators Productivity of Crop Soybean

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Abstract
The aim of research to know whether there is interaction of types compost rice straw or cow dung and dosage biochar of rice straw and cow dung to changes in chemical properties and physical soil, plant height and yield of soybeans in dryland degraded.The research was done on dryland Alfisols Bangkalan Madura, which a area 76% of the dry land area in Bangkalan (126 506 hectares) and 73% of large standard dry land in Madura, from 2011 until 2012.Research methods. The research design used a split plot design arranged in a randomized complete block design (RCBD). Factor I (main plot) types of compost 3 levels (O_0: no composting , O_1:compost of rice straw 10 tonnes / hectare, O_2: compost of cow dung 10 tonnes / hectare) and factor II (sub plot) 5 biochar dose levels (B_0: without biochar, B_1:biochar of rice straw 2 tonnes / hectare, B_2: biochar of rice straw 4 tons / hectare, B_3: biochar of cow dung 2 tonnes / hectare, and B_4: biochar of cow dung 4 tonnes / hectare. Soybean plants are used as an indicator in the study. Observations were made two weeks after planting (2 WAP) and two weeks after harvest (2 WAH).The results of the research: Two weeks after planting (2 WAP), the highest C organic soil on combination O_2B_4 (composted cow dung 10 tonnes/hectare and cow dung biochar 4 tonnes/hectare) is 3.354% (high), an increase of 246%. While at 2 WAH C organic soil 2.864% (high enough) an increase 195%. With the increase in soil carbon deposits 195% in two weeks after this harvest, dry land was originally relegated primarily soil organic C were very low (< 1%), soybeans can be planted at least 5 times a season. Besides increasing the productivity of land, a combination of compost 10 toness/hectare (both rice straw compost and cow manure compost) and dose biochar 4 tonnes/hectare (both biochar and biochar rice straw manure) can increase the productivity of soybean plants (2.259 to 2.298) ton/acres, and the results showed an increase in production compared to the average production of local farmers Madura (1.25 tonnes / ha), east Java province (1,342 tons / hectare) and the national average production (1,357 tons / ha) in 2010, resulting in an average increase in production of 74% of the average local production of Madura, east Java and national.
Keywords: degraded dry land, rice straw compost, cow dung compost, biochar of rice straw, biochar of cow dung and soil productivity.

Background

The concept of soil fertility to achieve the ideal situation for the growth and development of plants include water and air occupies the proportion of 50% of the total volume of soil, minerals and organic material occupies about 45% and 5%. **(1)**; **(2).** Although the proportion of organic matter is only 5%, it is the key for the continuity of the dynamics of life in the soil, or it can be said organic material is key to the dynamics of soil fertility. Organic materials is key for the dynamic properties land can be managed to the ideal conditions for plants **(3).**

Soil as a natural resource that is limited, difficult and slow recovery if the "misstep" in management. In wet tropical regions such as Indonesia, especially on dry land, the land susceptible to weathering is intensive enough that result degraded land. Most of the dryland having soil fertility and low organic matter content. The use of chemical fertilizers continuous most of the agricultural land in Indonesia would be nutrient poor. It can be said that the inputs of chemical fertilizer into the soil has reached the threshold of concern, and it is physically more difficult it is restored so that the land will be degraded. To restore soil fertility in degraded drylands especially chemical and physical properties of soil is the addition of organic matter into the soil. Improvement of soil physical, role of organic matter is the glue between the soil particles into aggregates so that the soil organic matter is important in the formation and improvement of soil structure becomes more stable. In chemistry properties , especially organic matter plays a role in the increased cation exchange capacity, pH of soil, and water holding capacity of the soil . However, a major problem in the management of organic matter is high dose to be given, especially in tropical regions such as Indonesia, where the decomposition of organic material very quickly lead to a low carbon stored in the soil, so that the application of organic manures should be given repeatedly **(4).**

Crops require C organic soil were sufficient (≥ 2%) to produce optimally. In Indonesia approximately ± 73% of agricultural land has a C-organic content of the soil <2%. The addition of organic matter into the soil in order to efficiently (not given repeatedly every season), especially in degraded drylands need to be combined